

AIR QUALITY MEASUREMENTS FOR
MOVABLE ASPHALT PLANTS FOR
RECYCLING PAVING ASPHALT

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Summary

Stack samples were taken from two movable asphalt plants that were processing a 50:50 ratio of recycled-to-virgin material. Both plants used a wet scrubber exhaust system. It was found that neither plant met Federal air quality standards for particulate emissions. The need for modification of wet scrubber systems is indicated.

Introduction

The stacks of two movable asphalt plants processing 50 percent recycled asphalt pavement were sampled for particulate emission at two construction sites during 1982. This work was performed at the request of R. A. Welke, Supervisor of the Testing Laboratory's Bituminous Technical Services Unit. Both of the plants tested used a wet scrubber exhaust system and both failed to achieve the standards.

The sampling procedure used for both tests was the 'Sampling Train Type A - Wet Media' method described in Michigan Department of Natural Resources Air Quality Division "Guidelines for Source Testing of Particulates." The procedure is essentially EPA Method 5 except that the dry filter media holder is positioned between the third and fourth impinger and the particulate captured in the impinger water is dried and included as part of the total particulate capture. Standard EPA Method 5 includes only the capture on the dry filter medium and washings from the nozzle, probe, and associated glassware ahead of the filter. The Wet Media method usually produces slightly higher results than Standard EPA Method 5.

Project 1

Project 1 was the reconstruction of a section of M 97 from 14 Mile Rd to 16 Mile Rd (Construction Project MBR 50031) near Mount Clemens, in Macomb County. The contractor was Ajax Materials Corp. The plant was a Boeing Co. drum mixer equipped with a "pyrocone" combustion control system and a wet scrubber exhaust system. The stack was round, 36 in. in diameter and 36 ft high, with two sampling ports at right angles. Two complete sampling runs of one hour each were accomplished (EPA Method 5 requires a minimum sampling time of one hour). The one-hour sampling period was divided equally among the ports, and the probe was moved systematically from the far edge of the stack to the near edge in each port. Stack velocity pressures varied from 1.2 to 1.9 in. of water indicating a stable and moderately high pressure stack. The plume appeared to be very clear except for water vapor when viewed from the ground, but when viewed from the sampling platform (about 30 ft above the ground) a bluish cast was

apparent as the plume dispersed near the ground. Very little fall-out of dirt particles was noted. The test results are presented in Table 1.

Project 2

Project 2 was the reconstruction of a 9.0 mile section of US 2 in Doyle and Mueller Townships in Mackinac County (Construction Project M 75022). The contractor was Bacco Construction Co. of Iron Mountain. The plant was a CMI drum mixer with mid-drum feed and a wet scrubber exhaust system. The stack was rectangular, 32 by 28 in. and 24 ft high, with three sampling ports all in one face. Two complete sampling runs of one hour each were accomplished. Stack velocity pressures varied from 0.8 to 2.7 in. of water indicating a moderately turbulent and high pressure stack. The plume appeared dark and seemed very wet as it exited the stack, indicating the presence of hydrocarbons and a high moisture content. Fall-out of particles was also noted. The presence of hydrocarbons was confirmed by the collection of dark oily material in the sampling probe and in the impingers. The results are presented in Table 1. The Federal emission standard is 0.04 gr/DSCF. This standard is also applied by the Michigan Department of Natural Resources.

TABLE 1
PARTICULATE CONCENTRATIONS
(50 Percent Recycled Material)

Project	Contractor	Location	Date Sampled	Particulate Concentration, gr/DSCF*	
1	Ajax	Romulus	September 2, 1982	0.10	0.08
2	Bacco	Blaney Park	September 22, 1982	0.21	0.38

* grains per dry standard cu ft

The Ajax plant used a large (about 100 ft long, 60 ft wide, and 10 ft deep) single pond as a water supply to operate the scrubber. The pond was located about 400 ft west of the plant. The pump inlet was about 6 ft below the water surface. Water draining from the scrubber was returned to the pond through an underground pipe.

The Bacco plant in Project 2 used a two-pond system as a water supply to operate the scrubber. Both ponds were plastic lined. Water was pumped from pond 1 to the scrubber which drained into a trench leading into pond 2.

Pond 2 overflowed into pond 1 at the opposite end from the pump inlet. Fresh water was continuously being added to pond 1 near the pump inlet. The water in pond 1 near the pump inlet appeared dirty even with the precautions of using a two-pond system.

Conclusions

As shown previously in the 1980 and 1981 reports (MDOT Research Reports R-1157 and R-1182), drum mix plants with wet scrubber exhaust systems have not yet shown they can achieve Federal air quality standards for particulate emissions when processing recycled paving asphalt. As suggested in the 1980 and 1981 progress reports, these plants could likely reduce their emissions by using clean water to operate their scrubbers and by lowering stack velocity pressures. Cleaner water could be obtained by using a continuous clean water supply or a filtered water supply system. Replacement of wet scrubber systems with baghouse filter systems should be considered for plants processing recycled paving asphalt.

Additional tests of plants processing recycled asphalt paving are planned for 1983 and succeeding years. The number of tests performed will depend on construction schedules.